REMARKS/ARGUMENTS

This paper is filed in response to the Office Action mailed November 14, 2006. At that time, claims 1, 2, and 4-16 were pending in the application. In the Office Action, the Examiner rejected claims 15 and 16 under 35 U.S.C. §103(a) over newly cited Inoue, et al. (United States Patent No. 3,998,458), newly cited McLain (United States Patent No. 4,089,727), or newly cited Anderson, et al. (United States Patent No. 7,124,797) in view of Angell, Jr. (United States Patent No. 4,804,509) and Novak (United States Patent No. 3,062,697). Claims 1, 2, and 4-10 were rejected under 35 U.S.C. §103(a) over the above-mentioned references taken with Prochaska, et al. (United States Patent No. 4,525,005), Fischer, et al. (United States Patent No. 4,649,080), Youngkeit (United States Patent No. 4,881,998), Matuska (United States Patent No. 4,629,644), or Carrow (United States Patent No. 4,504,086). Claim 5 was rejected under 35 U.S.C. §103(a) over the above-mentioned references taken with Carter, Young, Underwood, or Hof.

By this paper, all independent claims 1, 9, 15 have been amended. Support for the amendments to the claims is contained throughout the specification, including without limitation page 20, lines 18-20, page 25, lines 11-22, page 26, lines 1-22, and page 28, lines 3-18. Claim 2 is currently withdrawn.

Accordingly, claims 1 and 4-16 are presented for reconsideration and allowance by the Examiner.

Remarks

Independent claims 1, 9, 15 have now been amended to more specifically claim aspects of the present disclosure that distinguish from the references cited in the present Office Action. Specifically, claim 1 has been amended as follows:

A process for manufacturing a composite material comprising:

selecting a resin which is solid or semi-solid at ambient temperatures;

heating the resin to a temperature where the resin is in a liquid or viscous liquid state;

obtaining one or more filament bands, said one or more filament bands being comprised of a plurality of fibers and being at least about 0.5 inches wide;

impregnating said filament bands in said resin while said resin is in a liquid or viscous liquid state;

winding at least one filament band onto a rotating mandrel through successive winding passes sufficient to form a composite material; wherein each successive winding pass winds the at least one filament band alternatingly in first and second opposing directions; [[and]] wherein the at least one filament band is wound onto the rotating mandrel at least at two distinct, user-defined winding angles within at least one of the winding passes; wherein the at least one filament band is laid out on the mandrel at a first angle during an initial winding pass, is changed to a second angle during at least one central winding pass, and is returned back to the first angle during a subsequent winding pass; and wherein the resin provides tack that allows a previously laid section of the at least one filament band to maintain the angle in which the at least one filament band was placed on the mandrel and prevent the previously laid section of the at least one filament band from conforming to a new angle of the filament band when the angle is abruptly changed;

forming a composite material that includes the at least one filament band and resin; and

applying multiple layers of the composite material in differing orientations, at different locations, and in varying numbers of layers across the length of the mandrel during a single winding process; wherein the differing orientations, different locations, and varying numbers of layers are selected based upon determined load requirements of the composite material.

Claim 9 has been further amended as follows:

A process for manufacturing a composite component comprising:

determining load requirement for the component;

identifying the number of layers and orientation of filament bands to meet load requirements for the component;

creating a manufacturing control plan;

selecting a resin which is solid or semi-solid at ambient temperatures;

heating the resin to a temperature where the resin is in a liquid or viscous liquid state;

obtaining one or more filament bands, said one or more filament bands being comprised of a plurality of fibers and being at least about 0.5 inches wide;

impregnating said filament bands with said resin while said resin is in a liquid or viscous liquid state;

winding at least one filament band onto a rotating mandrel through successive winding passes; wherein the at least one filament band is wound onto the rotating mandrel at least at two distinct winding angles within at least one of the winding passes; [[and]] wherein the at least one filament band is wound according to the manufacturing control plan, such that the number of successive winding passes and the angles of the filament bands relative to the mandrel in each winding pass create a pre-form for the component; wherein the at least one filament band includes at least one strait section without crimping sections that is at least three times longer than the width of the at least one filament band; wherein the at least one filament band is laid out on the mandrel at a first angle during an initial winding pass, is changed to a second angle during at least one central winding pass, and is returned back to the first angle during a subsequent winding pass; and wherein the resin provides tack that allows a previously laid section of the at least one filament band to maintain the angle in which the at least one filament band was placed on the mandrel and prevent the previously laid section of the at least one filament band from conforming to a new angle of the filament band when the angle is abruptly changed; and

applying multiple layers of the at least one filament band in differing orientations, at different locations, and in varying numbers of layers across the length of the mandrel during a single winding process; wherein the differing orientations, different locations, and varying numbers of layers are selected based upon determined load requirements for the component.

Finally, claim 15 has been amended as follows:

A process for manufacturing a composite material comprising:

providing a rotating mandrel having a length;

providing a filament application section operatively associated with the mandrel;

associating one or more filament bands with the filament application section for winding on the rotating mandrel;

impregnating the one or more filament bands with a resin that is solid or semi-solid at ambient temperatures;

rotating the mandrel at a user-selectable rate to draw at least one impregnated filament band from the filament application section; and moving at least one of the mandrel and the filament application section relative to the other to cause the filament winding section to move along the length of the mandrel thereby winding at least one filament band onto the mandrel; wherein the relative movement of the mandrel and the filament application section proceeds in successive winding passes to form a composite material; wherein each successive winding pass consists of relative movement between the mandrel and the filament application section in alternating first and second opposing directions; [[and]] wherein the user-selectable rate of the rotating mandrel and the relative movement between the mandrel and the filament application section along the length of the mandrel are coordinated to wind the at least one filament band onto the mandrel at least at two distinct, user-defined winding angles within at least one of the winding passes; wherein the at least one filament band includes at least one strait section without crimping sections that is at least three times longer than the width of the at least one filament band; wherein the at least one filament band is laid out on the mandrel at a first angle during an initial winding pass, is changed to a second angle during at least one central winding pass, and is returned back to the first angle during a subsequent winding pass; and wherein the resin provides tack that allows a previously laid section of the at least one filament band to maintain the angle in which the at least one filament band was placed on the mandrel and prevent the previously laid section of the at least one filament band from conforming to a new angle of the filament band when the angle is abruptly changed; and

applying multiple layers of the composite material in differing orientations, at different locations, and in varying numbers of layers across the length of the mandrel during a single winding process; wherein the differing orientations, different locations, and varying numbers of layers are selected based upon determined load requirements for the composite material.

Applicants contend that claims 1, 9, and 15 as previously presented were in condition for allowance, for at least the reasons set forth below. However, Applicants have further amended the claims in order to further highlight distinctions between the claims and the prior art. As set forth above, each of the independent claims 1, 9, and 15, and all claims that depend therefrom, should be even more clearly distinct from the prior art and in present condition for allowance.

Rejections Under 35 U.S.C. §103(a)

The Examiner rejected claims 15 and 16 under 35 U.S.C. §103(a) over newly cited Inoue, et al. (United States Patent No. 3,998,458), newly cited McLain (United States Patent No. 4,089,727), or newly cited Anderson, et al. (United States Patent No. 7,124,797) in view of Angell, Jr. (United States Patent No. 4,804,509) and Novak (United States Patent No. 3,062,697). Claims 1, 2, and 4-10 were rejected under 35 U.S.C. §103(a) over the above-mentioned references taken with Prochaska, et al. (United States Patent No. 4,525,005), Fischer, et al. (United States Patent No. 4,649,080), Youngkeit (United States Patent No. 4,881,998), Matuska (United States Patent No. 4,629,644), or Carrow (United States Patent No. 4,504,086). Claim 5 was rejected under 35 U.S.C. §103(a) over the above-mentioned references taken with Carter, Young, Underwood, or Hof. In light of the arguments presented in this paper, and in further view of the amendments presented in this paper, Applicants respectfully submit that these rejections are overcome or are otherwise moot and request examination and favorable treatment of the currently presented claims.

A determination of obviousness is based on the factual inquiries of: (1) the scope and content of the prior art; (2) the differences between the claims and the prior art; (3) the level of ordinary skill in the pertinent art; and (4) secondary considerations of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966).

"The legal concept of *prima facie* obviousness is a procedural tool [that] ... allocates who has the burden of going forward with production of evidence in each step of the examination process." MPEP §2142. A *prima facie* case of obviousness is established only if the Examiner shows that (1) there is some teaching, suggestion, or motivation, either in the reference itself or in the knowledge generally available to one of ordinary skill in the art, to modify the reference; (2) there is a reasonable expectation of success; and (3) the prior art teaches or suggests all of the claim elements. *MPEP* §2143.03. Specifically, "Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination." *ACS Hosp. Sys., Inc. v. Montefiore Hosp.*, 732 F.2d 1572, 1577 (Fed. Cir. 1984).

With respect to claims 1, 9, and 15 as previously presented, Applicants respectfully submit that a *prima facie* case of obviousness has not been established at least because of the failure of the references, alone or in combination, to teach or suggest a method of winding at least two distinct, user-defined winding angles within at least one of the winding passes. Specifically, Anderson, et al. merely suggest that "the filament angle changes continuously as the filament is wound down the length of mandrel 1220". Col. 17, lines 8-10. A continuously changing filament angle does not teach "two distinct, user-defined" angles because a continuously and gradually changing angle never straitens to form a "distinct" and separate angle. Continuously changing or varying angles are not distinct angles. Distinct angles are discrete, clearly defined, and separate from gradual, continuous, or varying changes. Distinct angles as claimed may only be established through abrupt changes in direction, rather than mere continuously changing or varying angles.

Similar to Anderson, et al., Inoue, et al. teach an angle that varies "between 25° and 65°" or 30° and 45°. Col. 13, lines 50-56. Further, as shown in the drawings of Inoue, et al. at Figs. 11 and 12, the angle changes from 30° and 45° in Fig. 11 are varying and gradual, as are the angle changes from 4° and 8° in Fig. 12. Such varying angle changes are not distinct changes as set forth in the claims and as clarified above. Further, McLain merely teaches the possibility of varied angles and fails to teach distinct angles. McLain also fails to teach the step of establishing multiple distinct angles within a single winding pass on a mandrel.

By "distinct" contrast to the three references above, the disclosure of the claimed invention clarifies that a "distinct angle" is established "when the angle is abruptly changed". Specification, page 25, lines 19-20. As set forth in the specification, the claimed tack of the resin-impregnated filament band "will prevent the previously laid section of filament band 328 from conforming to the new angle of the filament band 328." Specification, page 25, lines 20-22. Thus, the previously claimed invention, taken as a whole, provides a combination of tacky resin with a winding operation the enables two distinct user-defined winding angles, rather than continuously changing or varying angles. For the foregoing and other reasons, the prior art of record, taken alone or in combination, fails to teach the invention as previously claimed.

With respect to claims 1, 9, and 15 as presently amended, and all claims that depend therefrom, Applicants respectfully submit that the Examiner's previous arguments are moot in view of the current amendments and that a *prima facie* case of obviousness has not been established at least because of the failure of the references, alone or in combination, to teach or suggest a method of winding wherein the resin provides tack that allows a previously laid section of the at least one filament band to maintain the angle in which the at least one filament band was placed on the mandrel and prevent the previously laid section of the at least one filament band from conforming to a new angle of the filament band when the angle is abruptly changed. As mentioned above, neither Anderson, et al., Inoue, et al., nor McLain teach abrupt change between multiple distinct angles as claimed.

Further, the references of record, alone or in combination, fail to teach or suggest a method of winding wherein the at least one filament band is laid out on the mandrel at a first angle during an initial winding pass, is changed to a second angle during at least one central winding pass, and is returned back to the first angle during a subsequent winding pass in combination with the remaining claimed elements.

Further still, the references of record, alone or in combination, fail to teach or suggest a method of applying multiple layers of the composite material in differing orientations, at different locations, and in varying numbers of layers across the length of the mandrel during a single winding process; wherein the differing orientations, different locations, and varying numbers of layers are selected based upon determined load requirements of the composite material. The specification clarifies that such claimed elements eliminate "the necessity of manually laying out multiple layers" in varying numbers, of composite material. See, for example, page 27, lines 8-11. Fig. 5 illustrates varying numbers of multiple layers across a cross section of a composite material which has been formed during a single winding process and without manual layering as set forth in the specification. For the foregoing and other reasons, the prior art of record, taken alone or in combination, fails to teach the invention as presently amended in the claims.

Finally, in the interest of completeness, Applicants respectfully note that claims 2, 4, and 6-8 depend from claim 1; that claims 10-14 depend from claim 9; and that claim 16 depends from claim 15. Each of these claims incorporates the subject matter of the claims from which they depend. Claims 1, 9, and 15 have been discussed above and the differences between these independent claims have been adequately identified. Applicants respectfully submit that claims 2, 4, 6-8, 10-14, and 16, which depend from these independent claims, are patentable for at least the reasons discussed above.

Applicants submit that all of the objections and rejections of the Office action have been addressed in the preceding amendments and remarks. With the entry and consideration of the above amendments and remarks, Applicants submit that all of the issues raised in the Office action have been addressed and resolved. Applicants submit that each of the currently pending claims is patentably distinguishable from the references applied for at least one or more of the reasons discussed above. Accordingly, Applicants respectfully request withdrawal of the rejections expressed in the Office action and allowance of all pending claims. If there are any remaining issues or if the Examiner has any questions, Applicants' undersigned attorney may be reached at the number listed below. Similarly, if the Examiner believes that a telephone interview may be productive in advancing prosecution of the present application, the Examiner is invited to contact Applicants' undersigned attorney at the number listed below.

Respectfully submitted,

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